

## **REMARKS**

Claims 1-20 are now pending in the application. The Examiner is respectfully requested to reconsider and withdraw the rejections in view of the remarks contained herein.

### **UNEXAMINED CLAIMS IN MOST RECENT OFFICE ACTION**

In the most recent Office Action, the Examiner has failed to provide any indication as to the allowability of Claims 8 and 9. Moreover, the Examiner has indicated that Claim 20 is allowable if rewritten in independent form including the limitations of the base claims and any intervening claims, yet also indicates that Claim 20 is rejected under 35 U.S.C. §103(a). Consequently, Applicants are unable to ascertain the status and/or appropriateness of any rejection related thereto. Accordingly, Applicants submit that any future Office Action should not be made final as no action on the merits has been provided.

### **REJECTION UNDER 35 U.S.C. § 102**

Claims 1, 3-7 stand rejected under 35 U.S.C. § 102(e) as being anticipated by Haussecker et al. (U.S. Pub. No. 2004/0213443). This rejection is respectfully traversed.

A. TO ANTICIPATE A CLAIM, THE REFERENCE MUST TEACH EVERY ELEMENT OF THE CLAIM

"A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference."

*Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). Applicants submit that Haussecker et al. fail to teach every element of the present claims.

By way of background, Applicants submit that Haussecker et al. merely teach a technique for identifying molecular structures based on fusing micron and nanometer-scale 2D images from known modalities, such as atomic force microscopy, scanning tunnel microscopy, and magnetic field microscopy. The fused resultant can be used to characterize the subjects. However, it should be readily apparent from a reading of Haussecker et al. that the teachings are related to identification of molecular structures based on images of a known model.

With specific reference to independent Claim 1, Applicants submit that Haussecker et al. fail to teach every limitation of the presently claimed invention. Specifically, Applicants submit that Haussecker et al. fail to teach “defining a macroscopic structural layout for the cage”. Haussecker et al. relate to characterization of molecular structure (Abstract, FIG. 3), which is on the nanometer scale. However, “macroscopic” is generally observable and measurable by the naked eye. Haussecker et al. are completely silent with regard to “defining a macroscopic structural layout for the cage satisfying the operational parameters” as claimed.

Moreover, in addition to the failure of Haussecker et al. to teach a “macroscopic structure layout”, it fails to “divid[e] the macroscopic structural layout of the cage into a plurality of discreet sub-segments” as claimed. Specifically, Haussecker et al. assign known images from different modalities to build a resultant model, NOT divide a macroscopic structural layout into discreet sub-segments.

Still further, Haussecker et al. fail to teach “defining a density distribution of the macroscopic structural layout by determining a density level for each sub-segment” as claimed. The Examiner indicates that such teachings in Haussecker et al. can be found in paragraph “[0019]”. (Office Action, Page 2). However, paragraph [0019] of Haussecker et al. merely states, in toto, “Definitions”. Applicants have been unable to ascertain from Haussecker et al. or the Office Action any such teachings that read on the present limitation. Accordingly, Applicants request clarification from the Examiner related thereto.

Finally, in connection with Claim 1, Applicants submit that Haussecker et al. fail to “defin[e] a microscopic structural layout for the cage by assigning pre-selected microstructures to the sub-segments in accordance with the density level of each sub-segment.” Specifically, Haussecker et al. are silent with regard to assigning pre-selected microstructures to the sub-segments in response to the density level of each sub-segment. Because of the silence of Haussecker et al., Applicants are unsure how the Examiner is applying the teachings of Haussecker et al. to these claim limitations. Accordingly, Applicants respectfully request that the Examiner provide specific recitation to the teachings of Haussecker et al. in any future Office Action, if issued.

Briefly, with regard to Claim 3, Applicants reiterate their argument that Haussecker et al. are silent with regard to “defining a macroscopic structural layout” and moreover that Haussecker et al. are silent with regard to “executing a topology optimization algorithm” as claimed. That is, Haussecker et al. employ existing structures in its technique. However, unlike the present application, Haussecker et al. fail to perform any type of calculation (i.e. algorithm), as presently claimed herein.

With regard to Claim 5, it should be repeated that Haussecker et al. fail to teach the use of multiple scale structural layouts. In other words, Haussecker et al. fail to teach “integrating the microscopic structural layout and the macroscopic structural layout”. The fact that Haussecker et al. are silent with regard to macroscopic structural layouts per se, it suggests that Haussecker et al. could not in and of itself teach such method step.

With regard to Claim 6, the Examiner has failed to identify any teachings in Haussecker et al. that read on the use of “solid free-form fabrication techniques”. A review of Haussecker et al. does not reveal any such teachings or mention of this technique. Accordingly, Applicants submit that Haussecker et al. fail to teach such limitation.

Lastly, with regard to Claim 7, Applicants submit that Haussecker et al. fail to teach “categorizing the sub-segments into different ranks based on the density level of each sub-segment, each rank being defined by a different length scale; and homogenizing the microstructure of a particular rank to an upper rank”. Specifically, Haussecker et al. are completely silent with regard to categorizing sub-segments into rank based on their density level and further fail to teach “homogenizing” the microstructure of a particular rank to an upper rank. Haussecker et al. make no mention of any type of computational technique, such as homogenizing the ranks.

For these reasons, Applicants respectfully submit that Haussecker et al. fail to teach every limitation of the present claims and, thus, fail to anticipate the present claims. Reconsideration and withdrawal of the present rejection are respectfully requested.

### **REJECTION UNDER 35 U.S.C. § 103**

Claims 2, 18 and 20 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Haussecker et al. (U.S. Pub. No. 2004/0213443) in view of Malone (U.S. Pub. No. 2002/0169507). This rejection is respectfully traversed.

Applicants respectfully direct the Examiner's attention to the arguments set forth above relating to Claim 1, as Claim 2 depends therefrom. Moreover, Applicants submit that Malone fails to cure the deficiencies of Haussecker et al..

Moreover, Applicants submit, as stated above, that Haussecker et al. fail to teach or suggest "generating a global density distribution under physiological loading for the cage using a global topology optimization algorithm". Haussecker et al. are silent with regard to any optimization algorithm. Despite the Examiner's assertions, FIGS. 4-6 do not appear to teach any such optimization algorithm.

Still further, Applicants submit that Malone merely teaches a specific cage design having an internal cavity with radial pores, but Malone is silent with regard to a number of claimed limitations. Specifically, Applicants submit that despite the Examiner's assertions, Malone fails to teach or suggest "segmenting the global density distribution architecture into a plurality of regions, each region having a material phase selected from: a low porosity solid phase; a high porosity solid phase; and a voided phase." The Examiner points to FIGS. 6-8 as teaching such limitations. However, it appears that Malone is merely teaching members having radial apertures. As the Examiner should appreciate, even read broadly, members having radial apertures are not analogous to "a low porosity solid phase, a high porosity solid phase; and a voided phase."

Moreover, Applicants submit that the Examiner's assertion that claim element "defining a porous microstructure for the cage by generating periodic microstructures for the regions having the high porosity solid phase and low porosity solid phase using a microstructure topology optimization method" is taught by paragraph [0041] and FIGS. 9-11 of Malone fails to give patentable consideration to all of the claimed elements, including but not limited to "using a microstructure topology optimization method".

Applicants respectfully submit that the teachings of Haussecker et al. and Malone are being mischaracterized and, moreover, that many of the specifically recited claim limitations of the present application are not being properly considered. Applicants submit that Haussecker et al. and Malone fail to teach each and every claim limitation of the present application. Accordingly, Applicants submit that the presently-pending claims are currently in condition for allowance.

Finally, Applicants wish to note that neither Haussecker et al. nor Malone provide any motivation for their combination. In fact, Applicants submit that any combination thereof is improper. However, Applicants, based on the apparent mischaracterization of the teachings of these references, reserve right to submit arguments related thereto until such time as the Examiner provides a clear basis for their combination.

#### **ALLOWABLE SUBJECT MATTER**


The Examiner states that Claims 10-17 and 19-20 would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. However, Applicants have elected to stay amendment thereof pending the Examiner's consideration of the remarks set forth herein.

**CONCLUSION**

It is believed that all of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicant therefore respectfully requests that the Examiner reconsider and withdraw all presently outstanding rejections. It is believed that a full and complete response has been made to the outstanding Office Action and the present application is in condition for allowance. Thus, prompt and favorable consideration of this amendment is respectfully requested. If the Examiner believes that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at (248) 641-1600.

Respectfully submitted,

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